Telecom Italia answer to the "ERG Project Team IP-Interconnection and NGN – Consultation document on IP interconnection"

Executive summary: key points

The deployment of NGNs which will benefit consumers through the widening of the portfolio of innovative services requires significant investments that have still to be made and committed to by operators. Telecom Italia consequently believes that NRAs should not impose undue and unproportionate regulation on NGN related issues such as the imposition of a specific interconnection model. Regulation on NGN and on NGN related issues has to be as light as possible to promote investments and innovation. In fact heavy regulatory obligations could hamper investments by discouraging operators to commit a large amount of money to the new infrastructures.

Telecom Italia is of the view that at this stage there is no evidence of emergence of NGN generated market failure that would justify a regulatory intervention aimed at mandating a single IP interconnection model. Moreover Telecom Italia believes that structural intervention on NGN interconnection issues such as the imposition of a specific charging model envisaged by ERG can not be enforced either on the basis of an SMP position either on the basis of a more general requirement of interconnection applicable to all telecommunication operators (article 5 of the Access directive).

In Telecom Italia's view NRAs intervention on interconnection issues should be mainly aimed at guaranteeing service interoperability. Telecom Italia is in fact firmly convinced that charging models applied to interconnection services in a NGN environment should be a market outcome.

Telecom Italia is of the view that there are no bottlenecks in the deployment of NG core network.
In NG access instead the existence of bottlenecks will be highly dependent on both the technical NG access solution adopted and on the competitiveness of the specific geographical area. Different technical solutions will have different implications in terms of the location and the architecture of the interconnection and in terms of the identification of enduring economic bottlenecks, if any. As a consequence, since no firm decision has yet been taken on NG access architecture, it is far too early to assess which economic bottleneck will emerge or fade away due to the deployment of NG access.

ETSI, the EU standardization body for (tele)communications, published the first "stabilised" NGN standards and specifications release in December 2005 and it is currently expanding the scope and the stability of the published document for a second release scheduled for the second half of 2007.

NRAs should focus on ETSI standardization NGN documents to deepen interconnectin issues within a stable framework. Telecom Italia believes that the current and future ERG work should be based on the following ETSI TISPAN definition of two distinct interconnection models:

- Service-oriented Interconnection (SoIx): the physical and logical linking of NGN domains that allows carriers and service providers to offer services over NGN platforms with control, signalling (i.e. session-based), which provides defined levels of interoperability.
- Connectivity-oriented Interconnection (CoIx): the physical and logical linking of carriers and service providers based on simple IP connectivity irrespective of the levels of interoperability.

Since the NGN deployment strategy will be mainly driven by the market appetite for new multimedia service at this stage it is not possible to gauge network topology issues such as the reduction of interconnection points.

A significant part of the consultation document seems to suggest that existing interconnections models (mainly element or capacity based) in a NGN environment could be replaced by Bill and Keep. Telecom Italia believes that the choice of a specific interconnection model is more related to the nature of the service provided than to the specific underlying technology. Besides NGN interconnection cannot be assimilated to a simple IP traffic exchange since each end-to-end NGN service uses different control and network resources depending on the peculiar characteristics of the specific service provided.

Bill & Keep, eliminating any asymmetry in termination rates (for instance it would preclude the possibility to differentiate mobile termination rates from fixed termination rates or incumbent termination rates from alternative operator termination rates) does not allow the remuneration of interconnection services according to the costs incurred to provide them. For instance the higher cost incurred by mobile operators in respect to the cost incurred by fixed operator in providing termination services with Bill and Keep would not be taken into consideration. Telecom Italia believes that the Bill and keep generated equivalence of termination charges is highly distortive since it does not anyhow reflect the resources involved in the provision of a specific interconnection service.

For this reason and for other reasons outlined in section 3 Telecom Italia believes that the application of the Bill & Keep charging model indiscriminately to all NGN services would be a mistake.

The regime that in Telecom Italia's view appears to be the most promising is a regime that foresees a differentiation of interconnection tariffs according to both the network hierarchy level and the different QoS of the service characteristics provided (for instance quality, availability/reliability, media requirements, etc). Such a regime somehow combines some of the features of two dual regime approaches indicated at page 28 of the ERG consultation document i.e. "different regimes for different services" and "different regimes for different network levels". However it has to be noted that the model Telecom Italia refers to is a flexible regime where different (at least for QoS) interconnection services while remaining within the existing element and capacity based models may nonetheless be charged at different prices as a consequence of service characteristics and network resources utilisation.

In conclusion Telecom Italia believes that the "dual regime" to be adopted has to allow the remuneration of the network resources employed to provide a service; as in the current interconnection mechanism inter-operator payments may refer to the traffic related resources of core and edge networks, while backhauling/access resources, dedicated to each customer, could be remunerated directly by the end user and would not be included in the inter-operators payments.

1. Objectives and NGN impact on regulatory obligations

Issues for consultation: Section 1 and 2 of the consultation document and third question.

Third question: Reflecting the transition towards NGNs what are the implications for existing SMP products and bottleneck facilities? Does this technological change remove existing SMP positions or bottlenecks or could new ones emerge in NGNs?

First of all Telecom Italia believes that it is important to make a clear distinction between the Next Generation Network (NGN) and the Internet environment. Whereas Internet network consists of a pure IP transport network without any quality guarantee and service awareness, NGN conversely is an innovative network and service platform based on IP technology capable of acknowledging, respecting and guaranteeing defined quality of services parameters. These NGN features enable the offer of "session-based" innovative voice and multimedia services (for instance VoIP, videoconference, messaging, etc.), also converging with ICT services, and transactional services such as for instance downloading, web navigation and e-commerce. In case of services involving more than one network the provision of end to end quality of services requires that both interconnected parties employ the technology enabling recognition, acknowledgment and respect of the defined quality of services QoS parameters (mainly related to network and service availability, reliability and security).

NGN are not an upgrade of traditional networks. In the short term an overlay scenario could be pursued so that PSTN and NGN will cohabit allowing the offer of innovative NGN based services next to the provision of traditional PSTN services. Since NGN enables both innovative and traditional (PSTN-like) services in a longer term view NGNs could entirely replace traditional networks.

It is important to underline that a single evolution path towards NGNs does not exist: the evolution of the network varies from country to country, depending on competitive conditions and the diffusion of broadband innovative voice and multimedia services; moreover, operators can decide not to replace the whole network, but only to introduce "IP-based" technology into existing telephone networks in order to progressively evolve toward a multi-service network. Usually NGN technology is implemented first in the higher hierarchical levels of the network and then (if the evolution of commercial offers requires so) in the lower hierarchical levels of the core network and in the access network.

The deployment of NGNs which will benefit consumers through the widening of the portfolio of innovative services requires significant investments that have still to be made and committed to by operators. Telecom Italia consequently believes that NRAs should not impose undue and unproportionate regulation on NGN related issues such as the imposition of a specific interconnection model. Regulation on NGN and on NGN related issues has to be as light as possible to promote investments and innovation. In fact heavy regulatory obligations could hamper investments by discouraging operators to commit a large amount of money to the new infrastructures. Besides the need of an infrastructure-based competition among operators should be considered and encouraged so that the deployment of NGN platforms by many operators is fostered rather than creating "virtual operators" environment.

Telecom Italia believes that NGN peculiar innovative characteristics call for a re-consideration of the existing regulatory approach, since the latter was suited for traditional technologies. NRAs should define remedies taking into account the level of maturity and stability of the new platform, the initial phase of investments by all the operators and the specific technology and infrastructure features. Moreover it is important to consider that differently from traditional legacy networks, which were developed in the public monopoly years and whose access needed to be regulated in order to open the market to competition, NGNs are new infrastructures that all operators, both incumbent and alternative, have to

deploy facing a similar starting point when to decide to make the investment. As a consequence, asymmetric regulation as that applied to legacy networks is not justified in the context of NGN.

Telecom Italia believes that NGN regulatory issues should be addressed as a part of the review of the EU regulatory framework and of the revision of the recommendation on relevant markets.

In relation to issues addressed in the Recommendation of relevant market consultation document Telecom Italia would like to point out that AGCOM, in its final decision on the wholesale broadband market, has imposed a broad requirement to provide alternative operators with access to any infrastructure / technology that the dominant operator uses or will use to provide retail services to its own customers. Such requirement has the potential to improperly expand regulation to NGN technologies/platform without conducting an appropriate substitutability analysis. Telecom Italia believes that this approach is not appropriate since NGN services, in principle, should not be subject to ex-ante regulation unless NRAs demonstrate through a sound substitutability analysis that the specific NGN service falls within the definition of a market susceptible of ex-ante regulation.

More specifically the ERG consultation document seems to consider a no interpayment model referred to as Bill and Keep (See section 3 for further details). To this regard Telecom Italia wish to underline that article 13 of the Access Directive states: "When imposing obligations relating to cost recovery and price controls, including obligations for cost orientation of prices and obligations concerning cost accounting systems,….. national regulatory authorities shall take into account the investment made by the operator and allow him a reasonable rate of return on adequate capital employed, taking into account the risks involved."

Imposing a no interpayment model which eliminates revenues from interconnection services clearly goes against this principle. SMP operators can be obliged to offer interconnection services at a cost-oriented price, but a zero interconnection charge is clearly below cost and thus cannot be imposed under cost-orientation.

In addition to regulation on the basis of an SMP position ERG seems to justify a structural intervention on NGN interconnection issues (charging model included) on the basis of article 5 of the Access Directive. Telecom Italia is of the view that resorting to article 5 of the access directive as the basis to justify intervention on NGN interconnection issues is not appropriate mainly for two reasons. Firstly the enforcement of charging models for interconnection services is out of the scope of article 5. Article 5 of the Access directive is aimed at ensuring interconnection among all telecommunications operators while does not cover charging issues. Secondly in the last consultation document on the review of the EU regulatory framework the Commission proposes to further limit the imposition of obligation to non – SMP operators (currently foreseen by article 5 of the directive) by extending both the prior notification requirement and its veto power to all obligations imposed on the basis of article 5. The European Commission proposes to introduce a procedure similar to that NRAs have to follow in case they want to impose remedies different from those explicitly included in the Access directive. By monitoring and reducing the flexibility and the autonomy with which NRAs can impose obligations on non-SMP operators the European Commission intends to limit the imposition of such obligations to exceptional cases guaranteeing a consistent approach across member states. Clearly the enforcement of charging model for interconnection services extends the scope of article 5 and thus it is not coherent with the aim of the European Commission proposal.

Telecom Italia is of the view that at this stage there is no evidence of emergence of NGN generated market failure that would justify a regulatory intervention aimed at mandating a single IP interconnection model. Moreover Telecom Italia believes that structural intervention on NGN interconnection issues (charging model included) envisaged by ERG can not be enforced either on the basis of an SMP position either on the basis of a more general requirement of interconnection applicable to all telecommunication operators (article 5 of the Access directive).

In Telecom Italia's view NRAs intervention on interconnection issues should be mainly aimed at guaranteeing service interoperability and, in case of disputes among operators, at setting economic conditions. To this regard it is worth noting that on this issue the ERG itself in its consultation document recognises that on IP-interconnection "In the majority of countries there are no complaints from competitors or disputes" (page 9 of the consultation document). Hence for the time being there is no evidence of the need of a regulatory intervention on IP interconnection issues.

Telecom Italia is in fact firmly convinced that charging model applied to interconnection services in a NGN environment should be a market outcome. Moreover NRA intervention on interconnection charging model would not be appropriate since it would go in the opposite direction of the European Commission goal of reducing ex-ante regulation.

In Telecom Italia's view the EU regulatory framework, instead of bestowing the power to rule on interconnection model charging issues, indeed, indicates that interconnection agreements should not be imposed by regulators and that commercial negotiation ought to be the first choice.

Accordingly, we see no reason why operators should be forced to adopt a particular scheme. In our view, operators are already free to adopt any model on a commercial agreement basis if they so wish (subject to non-discrimination, etc.). Regulators should encourage operators to reach commercial agreement and intervene only whether attempts to reach such agreements fail.

Operators have incentives to reach interconnection agreements without regulatory intervention. ISPs already reached commercial interconnection agreements in competitive markets and regulators were not involved. Similarly, in the mobile market, operators reached agreements on the exchange of SMS voluntarily without the need of any regulation imposing it. Thirdly, providers of unmanaged VoIP applications such as Skype and Yahoo (which are highly relevant to this topic) are interconnecting[1].

With regard to the information reported at pag. 4 paragraph 1.3 of the consultation document where is stated that "*native" IP-IP interconnection agreements are already in place in Italy* Telecom Italia would like to point out that the evolution of Telecom Italia network is only related to circuit switched interconnection and it does not deal with IP interconnection: IP technology is only used inside PSTN Telecom Italia core network level and it is limited to transport functionalities. Interconnection with other operators is entirely based on traditional circuit switching technology and no IP interconnection for telephony is currently available or needed.

In relation to the specific consultation question on the implications for SMP products and bottlenecks facilities due to the transition towards NGNs Telecom Italia believes that the deployment of NG core network and NG access imply entirely different consequences. For this reason we separate the consultation question into two parts: 1) implications for SMP products and bottlenecks facilities due to the deployment of NG core network; 2) implications for SMP products and bottlenecks facilities due to the deployment of NG access network.

1.1 Implications on SMP products and bottlenecks due to the deployment of NG core network

As already pointed out in the previous response to ERG questionnaire on this topic Telecom Italia is of the view that there are no bottlenecks in the deployment of NG core network. Indeed major competitors of Telecom Italia in the fixed and mobile telephony (Albacom, Wind, Tiscali, Vodafone, H3G etc) have already been able to develop, deploy and manage their own core networks without the need to make use of any Telecom Italia's network facility. Consequently there are no reason to believe that the same operators will face economic bottlenecks when deploying their NGN core network.

[1] In march Skype agreed to connect its VoIP service to that of competitor Yahoo. In August Skype signed a similar agreement with Google talk.

1.2 Implications on SMP products and bottlenecks due to the deployment of NG Access network

In the deployment of NG access network operators can adopt different architectural solutions, which implies that NGN functionalities can be located either in the exchange or in a downstream network point (typically the street cabinet). Operators will choose the most appropriate solution on the basis of market conditions, technological development and business conditions and country or geographical area specific characteristics.

Different technical solutions will have different implications in terms of the location and the architecture of the interconnection and in terms of the identification of enduring economic bottlenecks, if any. As a consequence, since no firm decision has yet been taken on NG access architecture, it is far too early to assess which economic bottleneck will emerge or fade away due to the deployment of NG access. Telecom Italia believes that the main point to retain is that in NGN context the existence of bottlenecks will be highly dependent on both the technical NG access solution adopted and on the competitiveness of the specific geographical area.

Even the permanency of the bottleneck characteristics of the legacy network elements may substantially differ across geographical areas. Consequently in the market analysis process NRAs should conduct a specific analysis aimed at identifying economic bottlenecks on a geographical area basis. For instance street cabinets are a critical issue not for the scarcity or the affordability of the product itself but rather for the difficulties that might arise in order to obtain the authorisations required to install them. Consequently they could represent a bottleneck only in those municipalities where obtaining authorisations is a major problem. Access conditions to ducts and sub-loop unbundling could also be included in the market analyses by NRAs, depending on the adopted NG solution. It is essential that such a review and service definition is harmonized at European level to avoid introducing distortions in the process of technological innovation and service development.

Moreover broadband access may also be provided over wireless access platform such as GSM/UMTS, Wi-Fi and Wi-Max. The wireless access platform reaches the customer's premise through a radio link and thus it does not require the copper network (street cabinets and the sub-loop unbundling circuits). Hence for istance in areas where Wi-Fi and Wi-Max are deployed there are no enduring bottleneck left.

2 NGN architecture and European standardization by ETSI

Issues for consultation: Section 3 of the consultation document, first and second question

First question: How should the transition from the PSTN number of interconnection points to the probably reduced number of interconnection points in NGNs look like? Which are the implications for the price structure and price level of interconnection rates?

Second question: What is the equivalent to "local" interconnection in NGNs?

As mentioned in the previous section, NGN can be deployed pursuing an overlay or a replacement strategy; besides NGN deployment will probably concern only some geographical areas of the national territory, since it is driven by market appealingness. Therefore the evolution of the network varies from country to country, depending on competitive conditions and the diffusion of broadband innovative voice and multimedia services; moreover, operators can decide not to replace the whole network, but only to introduce "IP-based" technology into existing telephone networks in order to make it evolve towards a multi-service network.

Thanks to the intense standardization activity in the last years ETSI published the first "stabilized" NGN standards and specifications release in December 2005. NRAs should focus on ETSI standardization NGN documents to deepen interconnection issues within a stable framework.

ETSI, as the standardization body for EU in the (tele)communication field, develops its work on NGN standards and architectures taking into consideration the several documents released by industry fora.

Indeed ETSI is the only standardization body that aims to define a unique interoperable NGN technical solution, relying also on specifications produced by all the other international fora. Conversely pieces of work produced by other organizations such as IETF and 3GPP solutions (IMS) tend to have a narrower application. For instance solutions released by 3GPP (IMS) are specific for mobile applications while IETF solutions are oriented to Internet applications. Moreover IETF solutions show a higher degree of implementation freedom which might lead to incompatible implementations.

In order to develop fully interoperable solutions NRAs should encourage the participation of each operator and provider (also related to Internet environment) to ETSI standardization activity. In fact NGN architecture covers also solutions (such as a generic SIP-based network) different from IMS-based one. Telecom Italia believes this is the sole approach that can lead to an effective interoperable multiservice NGN environment. Moreover Telecom Italia is of the view that NRAs should ensure that national standardization activity is developed in coherence with ETSI standards.

In its "Release 1 standards for NGN" ETSI, taking into consideration also relevant ITU recommendations, has come to the following NGN definition (from ETSI TR 180000 document): "*A Next Generation Network is a packet-based network able to provide services including Telecommunication Services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies."*

Telecom Italia believes that it is important to remark that ETSI NGN architectural model has to be considered a functional description aimed to define standardization process and its effective application is substantially market-driven: in particular NGN enables potential separation between service providers and network providers; while further logical separations of NGN across several functionalities (i.e. bearer capabilities, call/session control and application/service) is only a theoretical and simplified way to approach technical activities and it has no linkage with real business applications.

ETSI NGN definition introduces a clear separation between a pure IP connectivity interconnection and a service-aware interconnection. Telecom Italia believes that the current and future ERG work should be based on the following ETSI TISPAN definition of two distinct interconnection models:

- Service-oriented Interconnection (SoIx): the physical and logical linking of NGN domains that allows carriers and service providers to offer services over NGN platforms with control, signalling (i.e. session-based), which provides defined levels of interoperability.
- Connectivity-oriented Interconnection (CoIx): the physical and logical linking of carriers and service providers based on simple IP connectivity irrespective of the levels of interoperability.

In ETSI decision only the SoIx interconnection model is able to guarantee end-to-end quality, reliability, availability, security levels for each voice/multimedia services communication and to assure interoperability. CoIx interconnection is not aware of the specific end-to-end service provision and, as a consequence, just transport network performance can be assured, without any possibility for operators and providers to guarantee end-to-end communications services interoperability, quality, etc. for each communication.

In order to analyse NGN IP-interconnection issues from the standardization point of view, Telecom Italia believes that ETSI activity on NGN should be considered the key point from which to derive NGN structure indications.

The objective of the following section, describing NGN standardization framework, is to clarify the NGN network structure.

2.1 Standards for NGN in Europe: ETSI TSPAN activities and key aspects

ETSI standards and specifications represent the NGN technical framework for Europe. ETSI published the first "stabilized" NGN standards and specifications release in December 2005. A second release is scheduled for middle 2007; in ETSI traditional telecommunication operators, service providers and

manufacturers participate to standardization processes. The Telecoms & Internet converged Services & Protocols for Advanced Networks (TISPAN) committee is the ETSI core competence centre for the migration from switched circuit networks to packet-based networks with an architecture that can serve for both networks.

TISPAN is responsible for all aspects of standardization for present and future converged networks including the NGN (Next Generation Network) and including, service aspects, architectural aspects, protocol aspects, QoS support, security related matters, nomadicity and mobility aspects within fixed networks, using existing and emerging technologies. This work is in line with, and driven by, the business needs and commercial objectives of the ETSI membership.

ETSI TISPAN release 1 specification documents are commonly agreed both by the communities of Telecommunications operators and Internet Service Provider and, even if the "core" architecture is derived from the mobile network community (3GPP), it has been improved in order to include all the requirements of traditional fixed network, broadband network and Internet. Such activities are still in progress, but TISPAN Release 1 standards has outlined the key points for IP interconnection and related models, protocols and specific requirements, including the definition of basic telephone services and the adaptation of the signalling protocols coherently to the broadband network and the service logic needs.

Figure 1 shows a simplified model for interconnection, developed by ETSI in Release 1 standards (references are ETSI ES 282 001 and TS 123 228 documents).

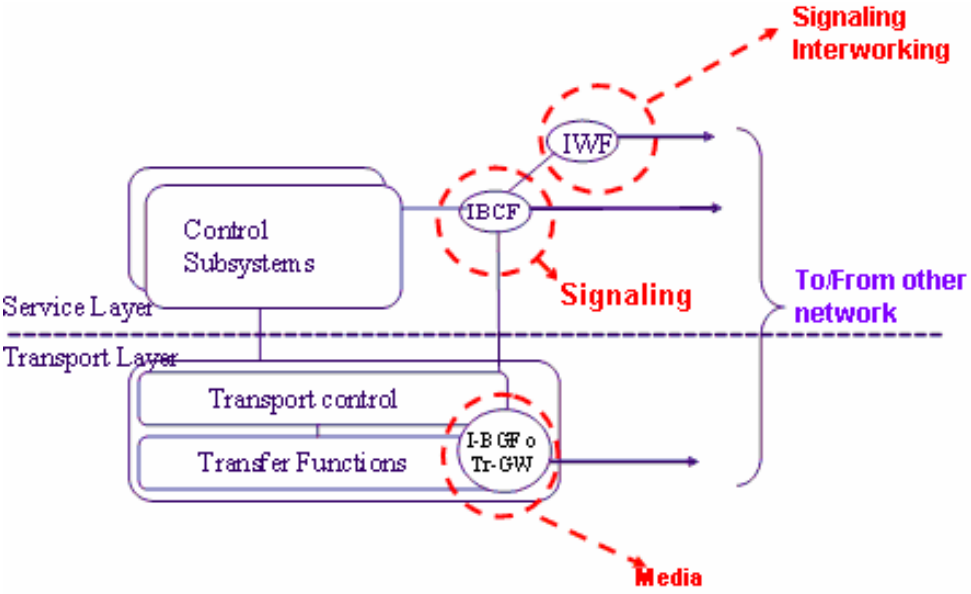

Figure 1 – ETSI TISPAN interconnection architecture for NGN

Figure 1 describes the separation of the NGN service layer and transport layer and highlights the needs to maintain such separation also for the analysis of interconnection to/from other networks. In particular, the IBCF (Intermediate Border Control Function) manages directly the requests (signalling level) from the operators and/or service providers through ETSI standardized SIP protocol, or through interworking functions (IWF) with operators/service providers that use different signalling protocols (i.e. H.323, PSTN, etc.). The I-BGF (Interconnection Border Gateway Function), or Tr-GW (Transition Gateway), handles the media transport related to specific services on the basis of the instructions provided through signalling.

The service "awareness", indicated in the section before, is obtained through a strict control of media transport by end-to-end signalling control which is applied also at the interconnection level: this is the relevant and distinguishing characteristic of SoIx interconnection model.

On this basis ETSI identifies the minimal requirements and functionalities that operators and providers have to assure in their NGN for service "aware" interconnection. Main requirements include the followings:

- IBCF and I-BGF gateway functionalities are the only elements acting as a interconnection boundary between operators/providers network domains;
- operators and service providers shall control the flow of service request through the signalling protocol which is used to control the set-up of the communication;
- ETSI has adopted SIP signalling protocol (the references are ETSI ES 283003/TS 124229 standards) as the unique protocol for NGN interoperability. Besides the specification of interworking function between SIP-based networks and traditional circuit-based telephony network is defined in ETSI ES 283027/TS 129163 standards.

Regarding interconnection it is relevant to consider that in Release 2 ETSI TISPAN will provide further details on the whole technical issues related to Network-to-Network Interface (NNI) for NGN interconnection, defining routing and resolution functions at interconnection level and improving the architecture in order to analyse new interconnection scenarios such us transit scenario and interconnection to general SIP-based network (i.e. for internet service provider).

2.1.1 ETSI NGN standardization activity overview on charging issues

With regard to NGN charging issues, initially based on 3GPP fora specifications for mobile IMS networks, ETSI defined a basic set of requirements in its NGN release 1 standards (reference is ETSI TS 122115); more in detail the main charging principles covered by the ETSI document are the following:

- "Calling Party Pays" charging principle is the default model;
- Split charging models between any of the parties, including 3rd parties, involved in a service communication.

In "ETSI TISPAN release 1" ETSI provided a first definition of charging functionalities. However considering the ongoing work these aspects will be deepened and stabilized in the next release (release 2).

Current ETSI standard (reference is ETSI TS 282010) covers only a high level definition of wholesale charging principles for NGN IP interconnection, in a multi-services context. In particular a pure NGN multi-operators/providers environment is considered in order to enable flexible charging functionalities among operators involved in the same service communications (specific identification scheme for operators are under study to amend ETSI SIP signalling protocol).

2.2 Interconnection evolution main issues

As indicated in the previous section, NGN deployment has to follow ETSI standard solutions especially at the interconnection level in order to guarantee a complete end-to-end service interoperability and to assure, for each communication session, specific requirements in terms of reliability, availability, security and quality, also in relation to possible regulatory requirements and agreements between operators.

The standard ETSI NGN architecture shown in Figure 1 tends to a flat hierarchy, due to IP technology features and innovation in the equipment capacity. This flatter hierarchy will likely lead to a reduction of network interconnection nodes .

Besides a distinction, as outlined in standard ETSI (CoIX and SoIX), between interconnection for bitstream transport services and interconnection for end-to-end communication services provision has to be provided. ETSI NGN standard definition of points of interconnection implies for operators/providers to identify specific gateway nodes, with logical and physical functionalities to guarantee availability, reliability and security requirements, independently from the specific internal network architecture adopted by the operators or provider.

Technical solutions and points of interconnection are in principle different according to the specific interconnection scenario and they will be influenced by NGN architecture characteristics such as traffic volume and the type of service provided (for instance the geographical or not geographical characteristics of the service and related numbering).

In such a context the existing concept of local interconnection for end-to-end service communications is likely to be overcome in NGN context as a consequence of technological evolution: a trend towards a coexistence of pure IP connectivity interconnection at access/edge network level (CoIX) and a service aware interconnection at core network level (SoIX) could be foreseeable.

Summing up, Telecom Italia believes that whole evolutionary NGN scenario depends on the progressive deployment strategy (overlay or replacement) followed by each operator. Since the NGN deployment strategy will be mainly driven by the market appetite for new multimedia service at this stage it is not possible to gauge network topology issues such as the number and the location of points of interconnection.

3 Charging models principles for services and connectivity

Issue for consultation: Section 4 and forth question

Forth question: How do you evaluate the advantages and disadvantages of different charging principles discussed in the paper?

As a introductory remark Telecom Italia wishes to underline that much of the consultation document uses the wording Bill & Keep as if it describes a single notion, when in fact it refers to two significantly different concepts:

- Internet traffic charging models, which are a combination of peering (balanced, no-interpayment) and transit (where a small operator or one with unbalanced traffic will have to pay the larger network). The choice of whether to peer or not is commercially driven and not regulated;
- a "no-interpayment" model of interconnection.

It would be much clearer if the consultation document distinguished between these, as they are substantially different. For example, in page III, the ERG consultation document says: "The Bill & Keep principle is widely applied for Internet traffic but also e.g. for the mobile sector in the USA." These examples are not the same thing:

- peering and transit is used for Internet;
- the mobile sector in the USA is using the reciprocal compensation regime, the same as for fixed ILECs. It is therefore not formally a no-interpayment regime, but it is true that it is not cost-based for the mobile operators and is similar in its incentives to no-interpayment regimes.

Hereafter by the use of wording Bill and Keep we mean "no-interpayment" model of interconnection.

In the internet environment the no-interpayment model is an interconnection charging model adopted only if traffic is roughly balanced in the two directions or where there is a lack of evidence of traffic imbalance (this imbalance may be caused by networks not being peers due to geographic coverage differences, for example)[2]. Unbalanced traffic leads to a "transit agreement" which entails the payment

[2] It is important to note that with the introduction of QoS based interconnection in order for the peering agreement to hold it is not sufficient that the total volume of traffic exchanged is symmetrical but the traffic should instead balance out at each QoS level. In fact if one network requires a higher QoS level from the other network, even if the overall exchanged traffic is

of an interconnection fee which may be element- or capacity-based (in the Internet charging for Transit is usually capacity-based, per Mbit/s per month).

A significant part of the consultation document seems to suggest that in NGN environment existing interconnection charging models could be replaced by Bill and Keep (BAK) .

The alleged superiority of the Bill and Keep (BAK) model lead to the question whether it should be imposed as a charging model in at least some interconnection situations.

The main reason in support of the adoption of a Bill and Keep model is that it overcomes the so called termination monopoly problem. In relation to this issue Telecom Italia would like to point out that in VoIP context where broadband penetration is continuously growing termination monopoly problem seems to cause less concerns than in the PSTN environment. In fact the freedom in setting termination rate allegedly enjoyed by access operators is somehow constrained by the existence of a substitute way by which end users can reach a broadband subscriber i.e. resorting to unmanaged VoIP services such as those provided by Skype, Google ect.

The ERG document does not discuss in detail interconnection with mobile operators and its particular characteristics. There is currently a massive disparity in termination rates between fixed and mobile operators in most countries. Telecom Italia is of the view that application of the no interpayment model to mobile operators would be particularly wrong because all positive effects due to the partial internalisation of network externalities would be lost [3]. More precisely imposing a zero interconnection charge would impede operators to internalise any portion of the externalities accrued by other operators' subscribers. Thus with the introduction of a Bill and Keep model we would move from a partial internalisation obtained with the current interconnection system which is explicitly accounted for in the regulatory decisions taken by NRAs (among others see Ofcom decision to set mobile termination charges at LRIC + an externality surcharge) to a situation where operators would be prevented from internalising any portion of the externalities accrued by other operators' subscribers.

Moreover an indiscriminate application of Bill & Keep would for instance artificially eliminate the asymmetry between fixed termination rates and mobile termination rates. Telecom Italia is of the view that this is not appropriate since the difference in prices correctly reflects the diverse transmission resources utilisation and the different costs of the equipment involved in the two termination services. This point is not raised in the consultation document.

Concerning the other main asymmetry that would be wiped out by the introduction of Bill and Keep i.e. the asymmetry between the fixed incumbent termination rates and the alternative operator termination rates whilst is difficult to justify and, as recommended by European Commission in many occasions, it should be only a transitory measure we note that some NRAs (such as AGCOM in its recent Market 9 decision) have recently strengthened and reaffirmed asymmetries.

With regard to the question stated in consultation document on whether Bill & Keep would necessarily imply switching from CPP to RPP, Telecom Italia notes that in countries where mobile interconnection relies on Bill & Keep (even the USA where as noted above, there can be CPNP charges but these are lower than the costs of termination), mobile operators charge customers to receive calls. This strongly suggests that no-interpayment would inevitably lead to RPP in mobile networks. If receiving party pays

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balanced, the hypothesis on which the Bill and Keep is based, i.e. the symmetry of the costs underlying interconnection, would not hold and consequently the Bill and Keep would not be adopted.

[3] Network externalities are benefits that are created to other subscribers from an individual's decision to join a network. This additional value that existing subscribers derive from a new subscription is essentially due to the fact they can now call and be called by the individual. This phenomenon is called "externality" since the additional value is accrued by individuals that do not participate in the new subscription transaction and thus this additional value goes to individuals "external" to transaction. The only way for operators to internalise externalities accrued by other operators' subscribers is through termination charges.

were precluded by regulators then this would create disincentives to provide the service and would create an incentive to pursue customers who make substantially more calls than they receive (eg telemarketers making calls or customer service centres receiving calls). Firms do not have any incentive to provide a good quality for services for which they are not rewarded.

Concerning the retail pricing scheme Telecom Italia believes that all pricing schemes should be allowed but the calling party pays should be considered the default model for communication services; calling and called split charging schemes exist today and they are likely to continue to exist in the future for specific services.

As noted by the ERG consultation document, lack of termination charges encourages those making unwanted calls (sometimes called SPIT in the VoIP community, by analogy with SPAM). Accordingly, regulation of service providers to ensure consumer protection may need to be strengthened (e.g. checking that service providers refuse to serve those who are making abusive calls). Incoming international traffic is particularly vulnerable to abuse, as it is difficult for EU regulators and operators to police.

In conclusion Telecom Italia believes that the choice of a specific interconnection model is more related to the nature of the service provided than to the specific underlying technology. Besides NGN interconnection cannot be assimilated to a simple IP traffic exchange since each end-to-end NGN service uses different control and network resources depending on the peculiar characteristics of the specific service provided.

Moreover charging models have to take into account the necessity to guarantee an appropriate return on investments, also considering costs of migrating legacy services to the new platform. The necessity to guarantee an appropriate return on investment it becomes even more vital in NGN environment since in multi-services environment the value chain will be made by a higher number of players which of whom should be remunerated for the value it adds to the final service.

The regime that in Telecom Italia's view appears to be the most promising is a regime that foresees a differentiation of interconnection tariffs according to both the network hierarchy level and the different QoS of the service characteristics provided (for instance quality, availability/reliability, media requirements, etc). Such a regime somehow combines some of the features of two dual regime approaches indicated at page 28 of the ERG consultation document i.e. "different regimes for different services" and "different regimes for different network levels". However it has to be noted that the model Telecom Italia refers to is a flexible regime where different (at least for QoS) interconnection services while remaining within the existing element and capacity based models may nonetheless be charged at different prices as a consequence of service characteristics and network resources utilisation.

In conclusion Telecom Italia believes that the "dual regime" to be adopted has to allow the remuneration of the network resources employed to provide a service; as in the current interconnection mechanism inter-operator payments may refer to the traffic related resources of core and edge networks, while backhauling/access resources, dedicated to each customer, could be remunerated directly by the end user and would not be included in the inter-operators payments.

The most efficient interconnection model is the model that will be chosen by the market. Consequently the only way that the NRAs and other stakeholders can assess whether the Telecom Italia evaluation or any other evaluation proves to be correct is to wait and observe which regime would prevail as a market outcome.